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COVID-19 and SIC (!)

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To the Editor,

Accurate risk stratification tools are paramount for optimal disease management. Patients with cardiovascular conditions, diabetes and cancer are most susceptible to COVID-19 complications leading to poor outcome[1]. These systemic diseases relate to enhanced fibrin formation and thromboinflammation. Indeed, severity of peripheral occlusive arterial disease correlates with the levels of both fibrinogen and its turnover measure D-dimer[2]. In severe COVID-19-infection, elevation of D-dimer and sepsis-induced coagulopathy (SIC), predicts poor prognosis. The incidence of venous thromboembolism (VTE) in patients with severe COVID-19 pneumonia is 25% (!)[3]. Furthermore, endothelial injury inherent to vascular procedures may predispose to coagulopathy in COVID-19. The benefit of low-molecular-weight heparin therapy is protection of critically ill patients against VTE, as well as its putative anti-inflammatory properties. Pulmonary

embolism (PE), triggered by severe infection, may be masked by the symptoms and signs of hypoxia in COVID-19. We advocate these considerations for vascular specialists.

A large retrospective Chinese cohort study[1] demonstrated that the fibrin turnover-measure D-dimer exceeding 1 µg/mL on admission was associated with an increased risk of in-hospital death (OR 20, 95% CI 6.5-61.56, P < .0001) in COVID-19 patients. Another retrospective study[4] assessed the benefits of anticoagulation on 28-day mortality, which does not appear to differ between heparin users (22%) and nonusers (mortality rates 30.3% vs 29.7%, respectively). However, patients with 6-fold D-dimer levels (3 µg/mL) to normal clearly benefited from anticoagulation, translating to lower mortality (32.8% vs 52.4%, P = .017). Therefore, D-dimer levels on admission are particularly useful for risk stratification in COVID-19 patients (Fig. 1).

Another important predictor of mortality is the International Society of Thrombosis and Haemostasis (ISTH) SIC-score[5], which includes prothrombin time (ratio >1.5), platelet count (<100 $x10^9$/l) and sequential organ function assessment (SOFA-score). In the above-mentioned study[3], patients with ISTH SIC-score of ≥4 treated with anticoagulation showed again lower 28-day mortality rates than the untreated ones (40% vs 64%; P=.029).

To guarantee the best outcomes for patients we suggest that all medical professionals, including vascular specialists, adhere to ISTH guidelines on recognition and management of coagulopathy in COVID-19 based on D-dimer and SIC-scores as major prognostic factors[6] (Fig. 1).

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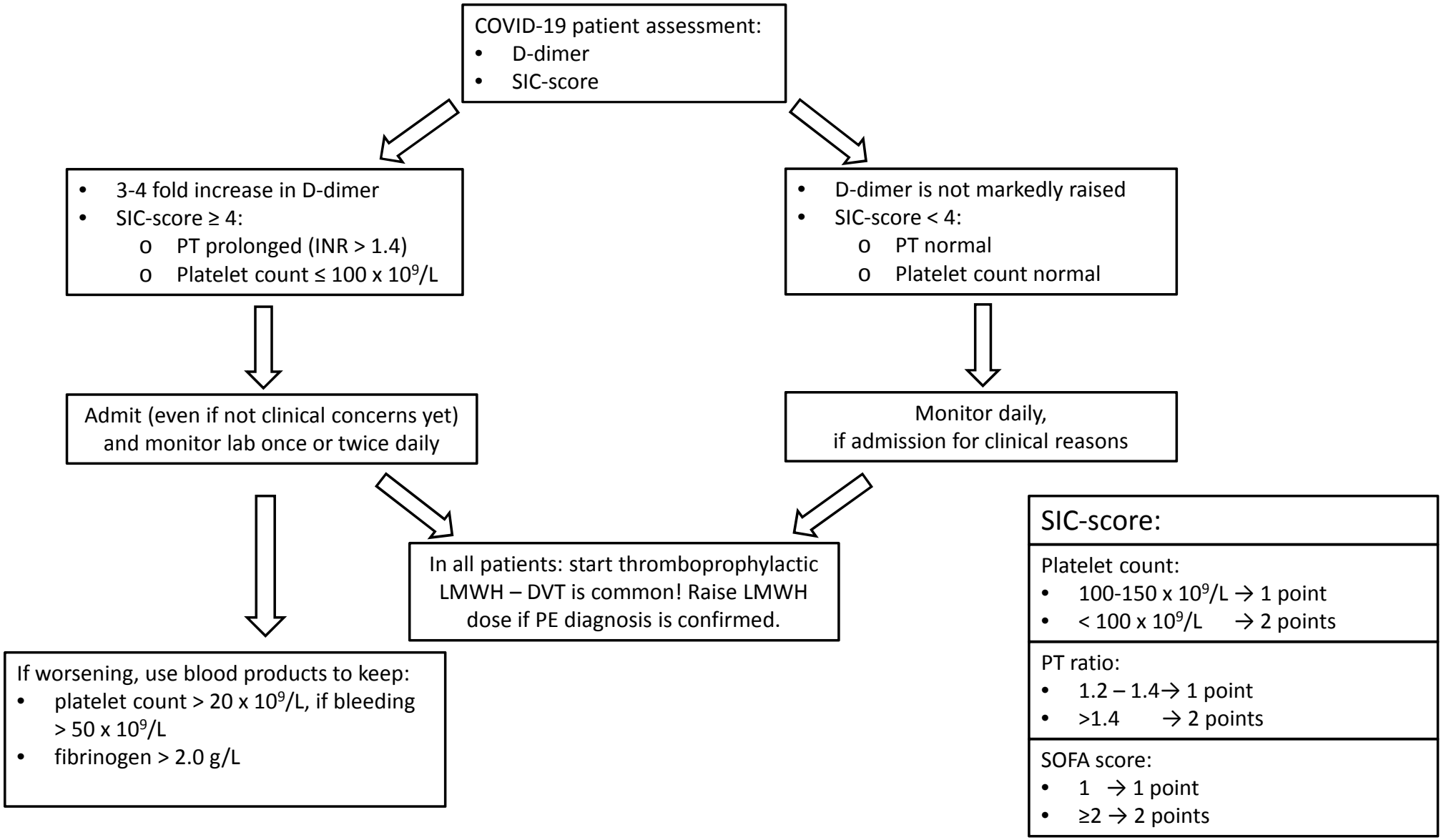
Figure 1. Outline of the algorithm for the management of coagulopathy in COVID-19 based on D-dimer and SIC-score. DVT – deep vein thrombosis, PE – pulmonary embolism, LMWH – low molecular weight heparin, SIC – sepsis-induced coagulopathy.


COVID-19 patient assessment:
• D-dimer
• SIC-score
• 3-4 fold increase in D-dimer
• SIC-score ≥ 4:
o PT prolonged (INR > 1.4)
o Platelet count ≤ 100 x 10^9/L
• D-dimer is not markedly raised
• SIC-score < 4:
o PT normal
o Platelet count normal
Admit (even if not clinical concerns yet) and monitor lab once or twice daily
Monitor daily, if admission for clinical reasons
In all patients: start thromboprophylactic LMWH – DVT is common! Raise LMWH dose if PE diagnosis is confirmed.
If worsening, use blood products to keep:
• platelet count > 20 x 10^9/L, if bleeding > 50 x 10^9/L
• fibrinogen > 2.0 g/L
SIC-score:
Platelet count:
• 100-150 x 10^9/L → 1 point
• < 100 x 10^9/L → 2 points
PT ratio:
• 1.2 – 1.4→ 1 point
• >1.4 → 2 points
SOFA score:
• 1 → 1 point
• ≥2 → 2 points